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(SILVICULTURE SERIES)

Forest Bulletin No. 41 (Revised) 1928

142

Note on Weights of Seeds

MADRAS FOREST COLLEGE
31 JUL 1928
COIMBATORE

BY
S. H. HOWARD

REVISED BY
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[*Continued on page 3 of cover.*

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Seed Weights and Plant Percents for Indian Trees.

Forest Bulletin No. 41 entitled "Note on Weights of Seeds" was prepared in 1920 by Mr. Howard who collected together the data then available at the Research Institute checking some against a certain number of weighments made in the United Provinces by Mr. Smythies. Since then, weighments have been continued as a routine measure for all seed received in the Silvicultural Branch with the result that figures have been obtained for additional species and those for many of the species of the 1920 list have been checked by new weighments. A few lists have been published or supplied by the Provincial research officers as indicated in the remarks column of the appended list.

Be.—Bengal, from "Nursery and Plantation Notes for Bengal, 1926."

Md.—Madras, by Mr. Connolly, Silviculturist.

U.P.—United Provinces from Mr. Howard's Forest Pocket Book.

1. Weighments.

As explained in the Bulletin quoted, the weighments, unless it is stated to the contrary, are made on seed which has been collected in all parts of India and dried sufficiently for despatch to Dehra Dun: on receipt it is spread in the sun for a day and then weighed and counted. The numbers weighed and counted are as large as possible, but are commonly low for large fruits as only small consignments are received. The seed is always freed from coarser pieces of fruit, twigs, earth, etc., before weighment.

In some cases, *e.g.*, *Phyllanthus Emblica* and *Butea frondosa*, one requires to distinguish between seeds and fruits, and it has been difficult to decide on any simple and uniform practice which can at the same time be described without ambiguity. A very large number of so called seeds are whole fruits (*Shorea*, *Holoptelea*), or include parts which properly belong to the fruit and not the seed (Walnut), though there is no chance of misunderstanding if the term seed is applied to them. For the many fruits which have a more or less pulpy outer layer, *e.g.*, *Gmelina*, *Zizyphus*, *Lauraceæ* and *Spondias*, it has been decided to accept the term "seed" as meaning the fruit stone after removal of the pulp, even if, as is usually the case, the seed proper is still enclosed in part of the ovary wall: so for such species fruit here means the whole fruits dried with

pulp, and "seed" means the fruit dried after removal of pulp. On the other hand, obviously entire fruits like *Fraxinus* will be found in the "fruits" columns, as also teak and sal. For legumes the difference is obvious. Fruits may of course contain one seed (*Shorea*) or several (teak) or really be aggregate fruits as in the case of the figs. *Quercus* 'acorns' are shewn as seeds because fruits might be taken to include the 'cups.'

In the case of not a few of the older data, it is not recorded what the condition of the seed was at the time of weighment, *e.g.*, whether a pulpy pericarp had been removed or not, so that such entries have not all the value one could wish. Again it is likely that the seed of not a few species has dried out more than it should on its way to the Research Institute as is often reflected in the very low germination recorded. Some of the more obvious cases of this have been omitted, but others probably remain. Yet another source of error is that the seed samples may be more or less selected big seed, or may be inferior, owing to unfavourable conditions at the time it was asked for, and this type of error can only be eliminated by averaging weighments from as many consignments as possible; once the seed is received, an actual sample is taken, selection by size being carefully avoided. Insect attack or lack of fertility resulting in lightness of seed, is a common defect and one very difficult to allow for; it is often responsible for the very different weights found in different lots of seed in such species as *Quercus incana* and *Pinus longifolia*. Seeds in which insect attack is apparent have been excluded by hand picking.

2. Season for Collection.

A reminder of the month in which the seed can be collected is useful when one is referring to the weighment list, and this has been compiled from all available sources, individual acknowledgment not appearing necessary. It naturally varies with locality and should be amplified and corrected as found necessary by any one using the list.

3. Germinative Capacity and Plant Percent.

It is realised that seed weighment lists would be much more useful if some indication could be given of the number of plants one can expect from the sowing of a given quantity of seed. Data are extraordinarily inadequate even for the commonest species, and even where figures exist, the conditions under which they were obtained are commonly not known.

For a useful account in English of the position reached up to 1916 in this branch of forestry, Chapter VII of Toumey's excellent book "Seeding and Planting" may be referred to, particularly pp. 106-133.

The number of plants obtained from a given quantity of seed—assuming the latter is a fair sample collected when properly ripe from healthy trees, and properly stored—will depend on :—

(*a*) Percentage purity.
(*b*) Viability or germinative capacity.
(*c*) Plant per cent. under given conditions.

The first item is rarely mentioned in Indian records, and the presumption is that tests have been made on clean seed though this is rarely available for large scale work with most species. The term germination percent, germinative capacity, viability and plant percent have all been extremely loosely applied, and it has to be deduced from each record which of these it is that has been determined, and there is always the suspicion that selected good seed instead of an average sample has been taken. A plea is made here that this lack of precision be remedied in the future. *Percentage purity* is readily determined. Only large pieces of foreign material which would not be present in seeds collected with ordinary care or which are readily removed by sifting may be removed before weighing the sample to be tested. All impurities are then separated by hand and the clean seed weighed. Some heavy kinds of seed which sink at once can be dealt with by placing in water, floating off foreign matter and redrying before weighing. Purity will vary from 99 per cent. for large seed easily extracted (*Aesculus*) to 25 per cent. for such a species as birch.

Viability or germinative capacity refers to the percentage of seed which will germinate under the most favourable conditions, and may be determined by direct inspection, or by various physical or germination tests, and results will naturally vary according to the method followed. The tests must always be done at least in duplicate and repeated if the difference is as much as 15 per cent. : at the Research Institute sets of 3 or 5 are done as far as possible. Germination tests carried out in soil are preferable in some ways to those in special media or with special apparatus, but are less easy to follow and have other drawbacks ; at the Research Institute a very light soil prepared by adding 50 per cent. of sharp sand to garden soil is used for large seed. The tests should be continued as long as germination continues but even so some apparently sound seed will be left which may germinate very late or even the next season : the numbers of such seeds should be recorded. In one such case, three tests with *Albizzia procera* gave 33 per cent., 21 per cent. and 22 per cent.

ungerminated but apparently good seed after 4 weeks. The term *germination percent* is perhaps the most commonly used in India, but is objected to by Toumey on the ground that it has often been used to mean the percentage which germinates *in a given length of time*, a figure for which the term germinative energy is preferred. We follow him in avoiding the use of 'germination percent' and adopting *germinative capacity* for the percentage actually viable. This figure may vary from 95 per cent. to well under 1 per cent. As already noted, much too high results will be obtained if selected best looking seed is used, and there may be a relatively very high variation if the seed storage conditions have been abnormal or too prolonged. It is thought that with present conditions in India little use can be made of germinative energy, but in recording the results of germination tests, times should always be given.

Percentage purity and germinative capacity can be combined to give a *Utilisation Value* for a seed sample, *i.e.*, ultimately the number of viable seeds in a given weight of seed as received.

The really useful figure for the executive officer is the *plant percent* which combined with percentage purity should tell him the number of seedlings he may expect from a given weight of seed. Plant percent is not as might be expected directly proportional to germinative energy, but falls progressively further below the germinative energy the lower the latter. Thus for Scots pine with 85 per cent. germinative capacity, a plant percent of 31 was found (Haack) and the ratio between the two indices is over twice this figure for seed with 65 per cent. germinative capacity. Germination tests carried out in soil give figures more approximating plant percent than those obtained with dishes, etc.

From these considerations it will be apparent that old records are of very little value, and if such are published here it is mainly to emphasise the total inadequacy of the information hitherto available, in the hope that all workers will do what they can to revise and supplement it.

4. Plants per pound of seed.

A figure has been calculated from the seed weights and the plant percent giving the number of seedlings which may be expected from 1 lb. of seed under fairly favourable conditions in the nursery. They are mostly based on single records, but if wrong, their publication should lead to their early correction by those attempting to apply them, and so will have served a useful purpose.

Species.	Month in which to collect seed.	Number.				Weighments.	Plant per cent.	Germinative capacity.	Number of tests.	Number of seeds or fruits tested.	Plants per lb.		Source of information. (No entry implies F.R.I.)	Remarks.
		Seeds.		Fruits.										
		Per oz.	Per lb.	Per oz.	Per lb.						Seed.	Fruit.		
Abies Webbiana	ix-xi	470	..	..	..	3	..	..	..	..	..	..	..	
Acacia arabica	ii-v	220	..	..	..	14	25	50	3	800	880	..	..	U. P. seed.
	iv-vi	..	..	..	..	..	..	..	..	..	..	..	Md.	
Acacia Catechu	i-iii	1,100	..	..	..	8	50	79	3	380	8,800	..	..	U. P. seed.
							91	..	1	1,250	16,100	..	..	
							50	97	1	1,156	8,800	..	..	Bu. seed.
	xii-i	..	..	..	..	..	..	..	..	..	..	..	Md.	
Acacia dealbata	..	2,450	..	..	..	1	20	..	1	50	7,800	..	..	
							68	..	1	300	26,800	..	..	
,, decurrens	..	2,225	..	..	..	3	58	..	1	300	20,700	..	..	
,, Farnesiana	ii-vii	330	..	..	..	5	..	..	..	..	..	..	..	
,, lenticularis	i-ii	..	..	..	128	1	..	..	..	..	..	..	..	
,, leucophlœa	i-vi	1,400	..	..	..	1	..	..	..	..	..	..	..	
Acer Campbellii	..	..	..	900	..	2	2	..	1	900	..	290	..	Single carpels.
							22	..	1	200	..	3,170	..	
,, oblongum	i-iv	..	..	600	..	2	..	..	..	..	..	..	..	Single carpels.
Acrocarpus fraxinifolius	iv-vi	900	..	..	..	1	..	..	..	..	..	..	..	

Species.	Month in which to collect seed.	Number. Seeds. Per oz.	Seeds. Per lb.	Fruits. Per oz.	Fruits. Per lb.	Weighments.	Plant per cent.	Germinative capacity.	Number of tests.	Number of seeds or fruits tested.	Plants per lb. Seed.	Plants per lb. Fruit.	Source of information. (No entry implies F.R.I.)	Remarks.
Adina cordifolia . .	iv-v	320,000	..	..	..	3	·001	..	1	128,000	6,000	..	..	Clean seed U. P.
	x-xii	..	..	..	..	..	..	..	..	..	..	..	..	Md.
				36	..	2	..	..	..	..	..	..	..	Heads.
Aegle Marmelos . .	iii-v	150	..	..	..	1	..	..	..	..	..	..	..	
Aesculus indica . .	ix-x	..	18	..	..	1	high	..	..	..	..	..	..	
„ punduana .	..	..	20	..	..	1	..	..	..	..	..	..	..	
Ailanthus excelsa . .	v	270	..	..	..	1	..	..	..	..	..	..	..	
Albizzia amara . .	xi-i	430	..	..	..	3	12	..	1	100	825	..	..	Md.
„ Lebbek . .	i-ii	200	..	..	..	7	40	94	3	600	1,280	..	..	U. P.
	xi-i	..	..	..	..	..	..	..	..	..	..	..	..	Md.
„ lophantha .	..	420	..	..	..	1	33	..	1	150	2,250	..	..	
„ lucida . .	ii-iv	600	..	..	..	2	..	..	..	..	..	..	..	
„ moluccana .	v-vi	1,200	..	..	..	1	..	..	..	..	..	..	..	
							28	..	1	50	5,400	..	T	
„ odoratissima .	i-ii	440	..	..	..	7	47	..	1	440	750	..	..	U. P.
	i	..	..	..	..	..	..	..	..	..	..	..	..	Md.
		650	..	..	..	3	..	..	..	..	..	..	..	After storage

Species.	Month in which to collect seed.	Number. Seeds. Per oz.	Seeds. Per lb.	Fruits. Per oz.	Fruits. Per lb.	Weighments.	Plant per cent.	Germinative capacity.	Number of tests.	Number of seeds or fruits tested.	Plants per lb. Seed.	Plants per lb. Fruit.	Source of information. (No entry implies F.R.I.)	Remarks.
Albizzia procera . .	i-iv	610	..	..	..	6	51	80	3	9,500	5,000	..	..	U. P.
„ „ . .	..	500	..	..	..	1	..	..	..	..	..	..	..	Bu.
„ „ . .	i	..	..	..	..	..	..	..	..	..	..	..	..	Md.
„ stipulata . .	xii-iii	900	..	..	..	1	..	..	..	..	..	..	..	
Aleurites Fordii . .	..	..	112	..	..	2	40	..	..	520	45	..	..	
Alnus nepalensis . .	ii-iii	124,000	..	..	..	3	..	..	..	..	..	..	..	
		14,000	..	..	..	1	7	..	..	112,000	157,000	..	..	Be.
„ nitida . . .	xi-xii	10,300	..	..	..	1	..	..	..	..	..	..	..	
Altingia excelsa . .	x-xi	70,000	..	18	..	1	..	..	..	..	..	..	..	Dry heads.
Amoora Rohituka . .	v-vi	55	..	..	..	1	..	..	..	..	..	..	..	
„ Wallichii . .	v	..	31	..	..	1	..	..	..	..	..	..	..	Be.
Anacardium occidentale .	iii-vi	..	70	..	..	1	47	..	..	45	33	..	..	
Anogeissus acuminata .	iv-v	1,100	..	..	..	4	..	..	..	..	..	..	..	Free from chaff.
„ latifolia .	iii	3,400	..	..	..	8	4	..	..	6,800	2,200	..	..	U. P. Free from chaff.
	xii-iii	..	..	..	..	..	0·3	..	..	3,400	160	..	..	Md. Free from chaff.
„ pendula .	xii-i	4,360	..	..	..	5	0·2	..	..	17,440	140	..	..	Md. Free from chaff.
Anthocephalus Cadamba .	viii-x	26,100	..	..	..	2	..	..	..	..	..	..	..	
							0·6	..	..	8,35,200	2,500	..	Be.	Clean seed.
Artocarpus Chaplasha .	vi-viii	50	..	..	..	2	..	..	..	..	..	..	..	Be.
„ Lakoocha .	vii	80	..	..	..	2	..	..	..	..	..	..	..	
							81	..	..	..	1,040	.-	T	
„ hirsuta . .	v-vii	..	..	..	..	..	81	..	..	860	..	..	Md.	
Avicennia officinalis .	viii-x	..	60	..	..	2	..	..	..	..	..	..	..	
Balanocarpus utilis .	xi-xii	..	..	6	..	2	..	..	..	..	..	..	..	
							52	..	..	600	..	75	Md.	

Species.	Month in which to collect seed.	NUMBER. Seeds. Per oz.	Seeds. Per lb.	Fruits. Per oz.	Fruits. Per lb.	Weighments.	Plant per cent.	Germinative capacity.	Number of tests.	Number of seeds or fruits tested.	PLANTS PER LB. Seed.	PLANTS PER LB. Fruit.	Source of information. (No entry implies F.R.I.)	REMARKS.
Bambusa polymorpha	..	750	..	..	..	1	..	..	..	..	..	..	..	
„ Tulda	..	1,000	..	..	..	1	..	..	..	..	..	..	Bu.	
Bassia butyracea	vi-vii	30	..	..	..	1	..	..	..	..	..	..	..	
„ latifolia	vi-vii	12	..	..	..	2	..	..	..	..	..	..	..	
„ longifolia	vi	12	..	..	..	1	..	..	..	..	..	..	..	
Bauhinia malabarica	i-v	320	..	..	..	1	..	..	..	..	..	..	..	
„ purpurea	i-iii	140	..	..	..	1	..	..	..	..	..	..	..	
							100	100	..	..	2,240	..	T	
„ racemosa	i-iii	220	..	..	..	2	..	..	..	..	..	..	..	
							70	60 to 95	..	..	2,460	..	T	
„ variegata	v	90	..	..	..	5	high	100	..	..	..	..	..	
Berrya Ammonilla	iv-vi	500	..	..	..	1	50	..	..	12	4,000	..	..	
	iii	..	..	..	..	..	..	..	..	..	20,000	..	..	
Betula cylindrostachys	..	250,000	..	..	..	1	..	..	..	..	..	..	..	
							0·5	..	..	2,000,000	..	..	Be.	
Bischofia javanica	xii-i	2,600	..	..	..	3	..	..	..	..	..	..	..	
							3	..	..	41,600	1,250	..	Be.	
	vi-i	..	..	..	..	..	..	..	..	..	..	..	Md.	

Species.	Month in which to collect seed.	NUMBER. Seeds. Per oz.	Seeds. Per lb.	Fruits. Per oz.	Fruits. Per lb.	Weighments.	Plant per cent.	Germinative capacity.	Number of tests.	Number of seeds or fruits tested.	PLANTS PER LB. Seed.	PLANTS PER LB. Fruit.	Source of information. (No entry implies F.R.I.)	REMARKS.
Bombax insigne	iv	400	..	..	..	4	28	..	..	100	1,800	..	..	
„ malabaricum	iv-v	820	..	..	..	10	31	38	4	9,630	4,100	..	..	
Boswellia serrata	v-vi	380	..	..	..	1	..	..	..	..	..	..	..	
Bridelia retusa	i-ii	480	..	..	..	1	..	..	..	..	..	..	..	
							75	..	..	..	5,750	..	T	
Broussonetia papyrifera	vii-ix	15,000	..	..	..	2	..	..	..	..	..	..	..	
„ „	..	..	..	..	40	1	..	..	..	..	..	..	..	
Buchanania latifolia	v-vi	100	..	..	..	3	87	..	2	1,100	1,400	..	..	
„ „	..	..	..	30	..	1	..	..	..	..	..	..	..	With pulp.
Bucklandia populnea	whole year.	7,700	..	..	..	6	34	..	1	150	42,000	..	..	
Bursera serrata	..	90	..	..	..	1	..	..	..	..	..	..	..	
Butea frondosa	v-vi	42	..	18	..	4	52	80	1	1,150	350	..	..	U. P. Seed.
							54	..	1	1,150	363	..	..	Bu. Seed.
Cæsalpinia coriaria	..	1,000	..	..	..	1	41	..	1	410	6,600	..	..	
„ digyna	..	40	..	..	..	2	40	..	1	40	250	..	..	
„ Sappan	..	..	..	..	64	1	..	..	..	..	..	..	..	
Calophyllum Inophyllum	iii	..	..	..	62	4	..	..	..	..	..	..	..	
„ tomentosum	ii-ix	..	..	..	..	..	..	..	..	..	..	..	..	
Carallia integerrima	vii-ix	350	..	..	..	1	..	..	..	..	..	..	..	
Carapa moluccensis	vii	..	25	..	..	1	..	..	..	..	..	..	..	Green.
			90	..	..	1	..	..	..	..	..	..	..	Dry.
Cassia auriculata	ii-iii	1,250	..	..	..	4	93	..	1	1,250	188,000	..	..	
„ Fistula	i-ii	155	..	..	..	5	12	22	1	60	300	..	..	
„ glauca	xii-ii	..	..	..	..	..	12	..	2	458	..	..	..	

Species.	Month in which to collect seed.	Number. Seeds. Per oz.	Number. Seeds. Per lb.	Number. Fruits. Per oz.	Number. Fruits. Per lb.	Weighments.	Plant per cent.	Germinative capacity.	Number of tests.	Number of seeds or fruits tested.	Plants per lb. Seed.	Plants per lb. Fruit.	Source of information. (No entry implies F.R.I.)	Remarks.
Casuarina equisetifolia	vi-xii	21,500	..	..	..	2	..	..	..	..	..	..	..	
							5	..	..	..	..	..	T	
Cedrela serrata	vii-viii	6,200	..	80	..	1	..	..	..	..	..	..	..	
„ Toona	v-vii	10,000	..	..	..	6	0·2	..	1	15,000	320	..	..	
	viii	..	..	..	..	..	..	..	..	..	..	..	Md.	
Cedrus Deodara	x-xi	250	..	..	..	3	..	..	..	..	..	..	..	
							high	..	..	..	..	..	T	
Ceriops Candolleana	..	..	..	9	..	2	..	..	..	..	..	..	..	
Chenopodium ambrosiodes	..	267,500	..	..	..	1	..	..	..	..	..	..	..	
Chukrasia tabularis	i-iii	2,300	..	..	..	5	52	..	1	5,700	19,100	..	..	
Chloroxylon Swietenia	v-viii	1,650	..	..	..	4	0·1	..	1	6,600	25	..	..	
Cinnamomum Camphora	x	300	..	..	..	3	45	..	1	1,500	2,200	..	..	Dry.
		130	..	..	..	7	..	..	..	..	..	..	..	Freshly pulped.
				80	..	1	..	..	..	..	..	..	..	Fresh.
Cinnamomum Cecidodaphne.	xi-i	48	..	..	..	4	..	..	..	..	..	..	..	
							32	..	1	688	250	..	Be.	
Cleistanthus collinus	iii-iv	250	..	..	..	2	56	..	2	6,100	2,200	..	..	
Cordia Myxa	vi-vii	120	..	..	..	3	..	..	..	..	..	..	..	
							low	..	..	..	..	..	T	

Species.	Month in which to collect seed.	Number. Seeds. Per oz.	Number. Seeds. Per lb.	Number. Fruits. Per oz.	Number. Fruits. Per lb.	Weighments.	Plant per cent.	Germinative capacity.	Number of tests.	Number of seeds or fruits tested.	Plants per lb. Seed.	Plants per lb. Fruit.	Source of information. (No entry implies F.R.I.)	Remarks.
Cordia vestita	x	80	..	..	..	1	..	..	..	..	..	..	..	
	..	..	..	..	..	..	50	..	..	..	640	..	T	
Corylus Colurna	x	..	..	35	..	1	..	..	..	..	..	..	..	
Cratæva religiosa	vii-ix	670	..	..	..	1	..	..	..	..	..	..	..	
							low	..	..	..	..	..	T	
Cryptomeria japonica	vii-viii	9,200	..	..	..	2	4	..	1	36,800	6,000	..	..	
Cupressus sempervirens	ii-iii	5,150	..	..	..	1	..	..	..	..	..	..	..	
„ torulosa	x-xi	6,800	..	..	..	4	..	..	..	..	..	..	..	
Dalbergia cultrata	xii-ii	350	..	..	..	1	..	..	..	..	..	..	..	
„ „	..	..	..	270	..	2	..	..	..	..	..	..	..	
„ latifolia	iii-iv	1,100	..	..	..	1	69	80	..	1,500	..	..	..	
	i-ii U. P.	..	..	680	..	13	..	..	..	..	..	..	..	
	..	..	..	..	..	..	67	..	..	..	..	7,300	Md.	
„ Oliveri	ii-iii	100	..	..	..	2	6	..	..	275	100	..	..	
„ paniculata	i-iii	180	..	..	..	1	..	..	..	..	..	..	..	
„ Sissoo	xi-iii	1,500	..	..	..	1	13	..	6	13,750	3,100	1,040	..	
	..	..	..	500	..	8	..	89	2	..	..	..	..	
Dendrocalamus longispathus.	..	3,200	..	..	..	1	..	..	..	..	..	..	..	
„ membranaceous.	..	1,000	..	..	..	..	1	..	..	..	..	..	Bu.	
„ strictus	v-vi	850	..	..	..	4	..	..	..	..	..	..	..	
							high	..	..	..	..	..	U. P.	
Dichopsis elliptica	..	12	..	..	..	1	43	..	1	8	80	..	..	
Dichrostachys cinerea	..	1,800	..	..	..	4	6	..	1	5,400	1,700	..	..	
Dillenia indica	xii-ii	1,500	..	..	..	3	low	..	..	..	..	..	..	
„ pentagyna	v	1,450	..	..	..	2	low	..	..	..	..	..	..	

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Diospyros Chloroxylon .	i-iv	180	..	..	..	1	..	..	..	..	..	..	..	
„ Ebenum .	ix-x	260	..	..	..	1	..	..	..	..	..	..	..	
„ Embryopteris .	v, vii, viii	24	..	..	..	2	..	..	..	..	..	..	..	
„ Melanoxylon .	iv-vi	30	..	..	..	4	..	..	..	..	..	..	..	
							60	..	..	..	300	..	T	
„ montana .	i	37	..	..	..	3	..	..	..	..	..	..	..	
							high	..	..	..	..	..	T	
„ tomentosa .	iv-vi	38	..	..	..	1	..	..	..	..	..	..	..	
Diptarocarpus Griffithii .	..	..	..	..	20	1	..	..	..	..	..	..	Bu.	
Duabanga sonneratioides	iv-v	723,000	..	..	..	1	0·5	..	1	1,084,500	57,800	..	..	
„ „ .	..	700,000	..	..	..	..	0·03	..	1	11,200,000	3,300	..	Be.	
Duranta Plumieri .	vii-ix	400	..	..	..	1	2	..	1	22,400	140	..	..	
Dysoxylum binectariferum	..	..	68	..	..	1	..	..	..	..	..	..	..	
Ehretia acuminata .	xi-xii	1,300	..	..	..	2	42	..	1	250	8,700	..	..	
„ lævis .	i-iv	2,000	..	..	..	1	..	..	..	..	..	..	..	
Elæodendron glaucum .	ii-vi	110	..	..	..	2	10	..	1	140	180	..	..	
„ „ .	..	..	..	..	..	..	60	..	..	..	1,050	..	T	

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Engelhardtia spicata .	..	900	..	..	..	1	..	..	..	..	..	..	..	
Enterolobium Saman .	..	..	1,000	..	..	1	..	..	..	..	..	..	Bu.	
Eriodendron anfractuosum	iii-iv	451	..	..	..	1	89	..	1	..	6,400	..	Md.	
Erythrina suberosa .	vi	180	..	..	..	2	63	..	1	265	1,800	..	..	
Eucalyptus Globulus .	v	10,000	..	..	..	1	5	..	2	2,052	8,000	..	..	
„ „ .	..	..	..	..	..	..	30	..	1	300	48,000	..	Md.	
„ „ .	..	..	..	..	..	..	11	..	1	10,000	17,600	..	Be.	
Eugenia Jambolana .	v-viii	32	..	..	..	2	56	..	1	150	300	..	..	
„ operculata . .	vi-vii	400	..	..	..	1	12	..	3	2,420	800	..	..	
Evodia fraxinifolia . .	..	2,700	..	..	..	1	..	..	..	..	..	..	..	
Excœcaria Agallocha .	viii-ix	250	..	..	..	1	..	..	..	..	..	..	..	
Ficus bengalensis . .	iv-v & x-xi	..	..	24	..	1	low	..	..	..	..	..	..	Dry figs.
„ elastica . . .	v-xii	..	..	20	..	1	„	..	..	..	..	..	..	„ „
„ glomerata . .	iii-iv & vii-viii	..	..	17	..	1	„	..	..	..	..	..	..	„ „
„ infectoria . .	v-vi & x	..	..	350	..	1	„	..	..	..	..	..	..	„ „
„ religiosa . .	iv-v & x-xi	..	..	130	..	1	„	..	..	..	..	..	..	„ „
„ retusa . . .	ii-iv	..	..	285	..	1	„	..	..	..	..	..	..	„ „
Fagræa fragrans . .	..	..	..	480	..	1	..	..	..	..	..	..	..	
Fraxinus excelsior . .	..	..	..	250	..	1	..	..	..	..	..	..	..	Lies dormant till 2nd year.
Gardenia latifolia . .	xii-vi	..	..	..	55	2	..	..	..	..	..	..	..	
Garuga pinnata . .	x-xi	120	..	20	..	1	58	..	1	250	1,100	..	..	
Gluta travancorica . .	v-vi	..	32	..	..	1	13	..	1	240	4	..	..	

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Gmelina arborea . .	v-vi	40	..	..	..	7	56	45	2	2,760	360	..	..	Seed from Chittagong.
							19	12	1	1,116	120	..	..	Seed from Buxa.
							60	39	1	1,380	380	..	..	Seed from Coorg.
							30	33	1	1,380	190	..	..	Seed from U. P.
							38	24	1	1,380	240	..	..	Seed from Burma.
							9	7	1	1,380	60	..	..	Seed from C. P.
	..	75	..	..	..	1	59	..	1	400	700	..	Md.	
Grevillea robusta . .	..	3,000	..	..	..	1	..	..	..	..	..	..	..	
Grewia oppositifolia .	x-xii	340	..	..	..	2	..	..	..	..	..	..	..	
,, tiliæfolia . .	vi-viii	550	..	..	..	2	1	..	1	4,400	90	..	..	Freshly pulped.
,, ,, . .	..	..	..	380	..	1	..	..	..	..	..	..	..	With pulp.
Hardwickia binata .	iv-v	..	..	110	..	4	31	..	1	168	550	..	..	
,, pinnata .	v-x	..	72	..	..	2	..	..	..	..	..	..	..	
,, ,, .	..	..	72	..	..	1	66	..	1	250	..	760	Md.	
Holarrhena antidysenterica	xi-ii	1,100	..	..	..	7	55	2	..	..	..	..	..	
Holoptelea integrifolia .	iv-v	..	..	750	..	2	49	..	1	390	..	5,900	..	
Homalium tomentosum .	..	8,800	..	..	..	1	..	..	..	..	..	..	..	
Hydnocarpus Wightiana .	v-vi	25	..	..	..	3	..	..	..	..	..	..	..	
Hymenodictyon excelsum	i-iii	4,800	..	..	..	1	34	..	1	150	26,000	..	..	

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Juglans regia . .	x-xi	..	50	..	..	2	..	..	..	..	..	..	..
							high	..	..	..	..	..	U. P.
Juniperus macropoda .	x	1,500	..	..	..	2	..	..	..	..	..	..	..
Kayea assamica . .	..	..	12	..	..	1	..	..	..	..	..	..	..
Kydia calycina . .	xii-ii	1,600	..	..	..	2	..	..	..	..	..	..	..
Lagerstrœmia floribunda	..	5,750	..	..	..	2	low	..	..	..	..	..	..
,, Flos-Reginæ	xi-i	4,600	..	..	..	4	3	..	1	270	2,200	..	..
,, ,,	..	..	..	12	..	1	..	..	..	..	..	..	..
,, microcarpa	..	240	..	..	..	1	..	..	..	..	..	..	..
,, parviflora .	xii-ii	800	..	..	..	2	0·4	..	1	38,400	51	..	..
,, tomentosa.	xi	7,100	..	..	..	4	..	..	..	..	..	..	..
Leucæna glauca . .	..	1,120	..	..	..	2	3	..	3	500	570	..	..
Litsæa polyantha . .	xi-xii & vi-vii	..	..	100	..	1	..	..	..	..	..	..	..
,, sebifera . .	xii-ii	..	..	240	..	1	..	..	..	..	..	..	..
,, umbrosa . .	x-xi	..	..	180	..	1	..	..	..	..	..	..	..
Machilus odoratissima .	vi	..	..	90	..	1	..	..	..	..	..	..	..
Mallotus philippinensis .	iii-v	660	..	..	..	5	..	..	..	..	..	..	..
Mangifera indica . .	iv-vii	..	..	..	..	..	41	..	1	300	..	..	Md.
Melia Azedarach . .	xi-ii	..	..	40	..	6	20	..	1	400	..	128	..
,, indica . . .	vi-viii	..	..	50	..	1	46	..	2	1,150	..	370	..
Mesua ferrea . . .	x-iv	10	..	..	..	5	46	..	2	200	74	..	..
Michelia Champaca .	v-vi	450	..	..	..	3	40	..	1	525	2,900	..	..
Michelia excelsa . .	x-xi	240	..	..	..	5	..	..	..	..	..	..	..
		400	..	..	..	1	20	..	..	..	850	..	Be.

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Mimusops Elengi	vi-vii	55	..	17	..	1	..	..	..	..	..	..	..	
Morus lævigata	iv-vi	12,400	..	..	..	2	..	..	..	..	..	..	..	
Murraya Kœnigii	vii-x	180	..	..	..	1	..	..	..	..	..	..	..	
Odina Wodier	v-vi	270	..	..	..	1	14	..	1	1,080	600	..	..	
Olea cuspidata	ix-xii	250	..	..	..	1	36	..	1	400	1,440	..	..	
Oroxylon indicum	xii-ii	310	..	..	..	2	..	..	..	..	..	..	..	
							95	..	..	..	4,700	..	T	
Ougeinia dalbergioides	v-vi	800	..	..	..	1	26	76	1	100	3,300	..	..	
„ „	..	..	..	365	..	4	19	..	2	1,460	..	1,100	..	
Parashorea sp.	..	..	360	..	..	1	..	..	..	..	..	..	Bu.	
Pentace burmanica	..	..	..	800	..	1	..	..	..	..	..	..	Bu.	
Phyllanthus Emblica	xii-iv	1,900	..	..	..	2	13	..	1	790	3,950	..	..	
Picea Morinda	x-xi	1,800	..	..	..	2	44	..	1	200	12,700	..	..	
Pinus excelsa	ix-xi	450	..	..	..	2	63	..	1	200	4,500	..	..	
„ Gerardiana	ix-x	80	..	..	..	2	..	..	..	..	..	..	..	
„ Khasya	ii-iii	92	..	..	..	2	..	..	..	..	..	..	..	
„ longifolia	i-vi	250	..	..	..	7	37	80	1	150	1,500	..	..	
„ Merkusii	iv-v	40	..	..	..	1	..	..	..	..	..	..	..	
„ radiata	..	1,450	..	..	..	1	..	..	..	..	..	..	..	

Species.	Month in which to collect seed.	Number. Seeds. Per oz.	Seeds. Per lb.	Fruits. Per oz.	Fruits. Per lb.	Weighments.	Plant per cent.	Germinative capacity.	Number of tests.	Number of seeds or fruits tested.	Plants per lb. Seed.	Plants per lb. Fruit.	Source of information. (No entry implies F.R.I.)	Remarks.
Piptadenia oudhensis	iv-v	880	..	..	..	1	98	..	1	450	13,800	..	..	
Podocarpus neriifolia	iii	22	..	..	..	1	36	..	1	176	120	..	..	
Pongamia glabra	i-iv	..	..	13	..	3	80	..	1	576	..	170	..	Seed from Burma.
„ „	..	..	..	..	..	..	33	73	1	620	..	70	..	Seed from Delhi.
Populus euphratica	iv-v	..	..	1,200	..	3	very low.	..	..	..	..	..	..	Capsules.
Prosopis juliflora	v-vi	440	..	..	..	1	6	..	2	880	420	..	..	
„ spicigera	vi-viii	740	..	..	..	2	..	..	..	..	..	..	..	
Prunus Puddum	..	..	1,500	..	..	1	..	..	..	..	..	..	Bu.	
Pterocarpus dalbergioides	i-iii	..	..	35	..	1	..	..	..	..	..	..	..	
	..	..	..	..	..	..	55	..	..	..	..	300	T	
„ indicus	i-ii	..	..	90	..	3	..	..	..	..	..	..	..	
							low	..	..	..	..	..	T	
„ macrocarpus	xii-ii	..	..	50	..	4	..	..	..	..	..	..	..	
							low	..	..	..	..	..	T	Mostly lies dormant till 2nd year.
„ Marsupium	iii-iv	..	..	45	..	8	55	..	2	90	..	400	..	In 2 years.
„ „	..	..	..	..	..	..	8	..	2	5,550	..	60	..	1st year only.
„ santalinus	ii-iii	..	..	40	..	5	8	..	1	25	..	50	..	
Putranjiva Roxburghii	ii-iii	..	..	45	..	2	..	..	..	..	..	..	..	
							23	..	..	..	..	166	T	
Quercus acuminata	..	18	..	..	..	1	Variable	..	..	..	..	..	..	
„ dilatata	ix-x	..	..	..	..	..	..	93	2	276	..	..	..	Much insect attacked; sound seed has high germination.
„ glauca	xi-xii	16	..	..	..	5	..	..	..	..	..	..	..	Much insect attacked; sound seed has high germination.

Species.	Month in which to collect seed.	Number. Seeds. Per oz.	Number. Seeds. Per lb.	Number. Fruits. Per oz.	Number. Fruits. Per lb.	Weighments.	Plant per cent.	Germinative capacity.	Number of tests.	Number of seeds or fruits tested.	Plants per lb. Seed.	Plants per lb. Fruit.	Source of information. (No entry implies F.R.I.)	Remarks.
Quercus incana . .	xii-ii	15	..	..	..	7	18	..	1	240	45	..	..	
„ lamellosa . .	xi-xii	..	112	..	..	2	72	..	1	25	80	..	..	
„ „ . .	..	..	..	..	..	..	80	..	..	..	..	..	Be.	
„ lanuginosa .	xii-i	70	..	..	..	1	..	..	..	..	..	..	..	Much insect attacked; sound seed has high germination.
„ pachyphylla .	xi	10	..	..	..	1	6	..	1	30	10	..	..	
„ semecarpifolia .	vi-viii	..	64	..	..	2	..	..	..	..	..	..	..	
							90	..	..	..	57	..	T	
„ serrata . .	ix-x	..	112	..	..	3	..	..	..	..	..	..	..	
							fair	..	..	..	..	..	T	
„ spicata . .	ix-x	16	..	..	..	1	..	..	..	..	..	..	..	
Rhododendron arboreum	i-iii	330,000	..	..	..	2	low	..	..	..	..	..	..	
„ „ .	..	..	..	60	..	1	..	..	..	..	..	..	..	Capsules.
Rhus parviflora . .	vi-vii	2,600	..	..	..	2	..	..	..	..	..	..	..	
Santalum album . .	v-viii & xi-xii	..	..	120	..	7	..	..	..	..	..	..	..	
Sapindus detergens .	xi-i	22	..	..	..	3	17	..	2	700	60	..	..	
„ emarginatus .	ii-iv	65	..	..	..	1	1	..	1	1,040	10	..	..	

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Sapium sebiferum . .	xii-ii	235	..	..	..	3	..	..	..	..	..	..	..	
Schima Wallichii . .	xi-i	10,000	..	..	..	2	1	..	1	320,000	1,600	..	Be.	
Schleichera trijuga . .	x-xi	43	..	..	..	4	22	..	2	938	150	..	..	
Schrebera swietenioides .	ii-iii	180	..	..	..	1	..	..	..	..	..	..	..	
							61	71	20	1,005	..	137	..	I. F. 1928.
Shorea robusta . .	v-vii	240	..	14	..	..	..	..	..	..	..	..	..	
„ „ . .	..	..	..	..	..	..	69	..	2	1,140	..	155	..	
„ „ . .	..	..	..	..	..	..	60 to 70	..	..	24,700	..	145	T	F. Bull. No. 8 of 1912.
Sonneratia acida . .	..	1,900	..	..	..	..	1	..	..	..	..	..	..	
„ apetala . .	viii-ix	1,400	..	..	..	..	1	..	..	..	..	..	..	
Soymida febrifuga . .	vii-viii	320	..	..	..	3	28	..	2	220	1,400	..	..	
Spondias mangifera .	xii-ii	..	128	..	..	5	44	..	1	43	56	..	..	
„ „ .	iv-v Md.	..	..	..	32	2	..	..	..	..	..	..	..	
Stephegyne parvifolia .	xii-ii	300,000	..	..	..	2	..	..	..	..	..	..	..	
Sterculia alata . .	vi-vii	35	..	..	..	1	..	..	..	..	..	..	..	
„ colorata . .	..	..	4,150	..	..	1	..	..	..	..	..	..	Bu.	
„ villosa . .	iv-v	160	..	..	..	2	..	..	..	..	..	..	..	
							6	..	..	..	150	..	T	
Stereospermum chelonoides	xii	270	..	..	..	1	low	..	..	..	..	..	..	
„ suaveolens	xii-i	800	..	..	..	4	10	.	1	810	1,300	..	..	
Strychnos Nux-vomica .	xii-ii	18	..	..	..	1	..	..	..	..	..	..	..	
							50	..	..	..	150	..	T	

Species.	Month in which to collect seed.	Number. Seeds. Per oz.	Number. Seeds. Per lb.	Number. Fruits. Per oz.	Number. Fruits. Per lb.	Weighments.	Plant per cent.	Germinative capacity.	Number of tests.	Number of seeds or fruits tested.	Plants per lb. Seed.	Plants per lb. Fruit.	Source of information. (No entry implies F.R.I.)	Remarks.
Swietenia Mahagoni	x-xii	100	..	..	..	1	..	..	..	..	..	..	..	
Tamarix articulata	xii-ii	8,150	..	..	..	1	..	..	..	..	..	..	..	
Taraktogenos Kurzii	..	..	128	..	..	2	..	..	..	..	..	..	..	
Tecoma undulata	v-vii	3,500	..	..	..	4	4	..	1	1,750	2,250	..	..	
Tectona grandis	xi-i	..	..	45	..	15	42	..	1	7,000	..	300	..	Bu. Seed.
				60	..	1	..	..	..	..	..	..	..	U. P. Seed.
				60	..	1	..	..	..	..	..	..	..	C. P. Seed.
Teinostachyum Helferi	ii-iii	..	96	..	..	1	..	..	..	..	..	..	..	
Tephrosia candida	..	1,300	..	..	..	1	..	..	..	..	..	..	..	
Terminalia Arjuna	xii-ii	..	..	..	80	3	34	..	2	560	..	27	..	
„ belerica	ii	12	..	..	..	3	52	69	2	400	100	..	..	
„ „	..	..	..	..	80	1	..	..	..	..	..	..	..	
„ Chebula	i-iii	..	..	..	64	6	18	..	1	90	..	12	..	
„ myriocarpa	iii-vi	..	..	..	..	..	..	..	..	..	..	5,400	Be.	
„ pallida	..	..	..	11	..	1	13	..	1	75	..	20	..	
„ paniculata	xii-v	..	..	1,760	..	1	low	..	..	..	..	..	..	
„ tomentosa	ii-iv	..	..	15	..	16	27	70	4	3,080	..	65		
Thespesia populnea	..	1,000	..	..	..	1	..	..	..	..	..	..	Bu.	

Trewia nudiflora	xi-xii	160	..	..	..	3	35	..	1	1,000	900	..	..
Tsuga Brunoniana	xi	10,800	..	..	..	3	6	..	1	150	10,400	..	..
Vateria indica	v-viii	..	..	..	25	2	..	..	..	..	..	..	..
							96	..	1	750	..	24	Md.
Vitex altissima	vii-viii	335	..	..	..	1	0·15	..	1	670	8	..	..
Wrightia tomentosa	xii-ii	1,650	..	..	..	2	..	..	..	..	..	..	..
							high	..	..	..	..	..	T
Xylia dolabriformis	xii-i	146	..	..	..	7	31	..	1	200	720	..	..
„ „	..	..	1,700	..	..	1	..	..	..	..	..	..	Bu.
„ xylocarpa	vi-vii	90	..	..	..	1	97	..	1	200	1,400	..	..
		140	..	..	..	1	50	..	1	300	1,120	..	Md.
Zizyphus Jujuba	xi-ii	50	..	..	..	6	27	31	1	64	216	..	..
„ xylopyra	ii-iii	..	96	..	..	1	10	..	2	160	10	..	..

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